The Experience of ABACC in Applying Regional Safeguards

Presented at the "Russian International Conference on Nuclear Material Protection, Control and Accounting", Obninsk, Russia, 9-14 March 1997.

by

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The Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) applies regional safeguards to all nuclear materials in all nuclear installations of Brazil and Argentina.

First of all, some general figures about Brazil and Argentina: Argentina and Brazil are, respectively, the 8th and 5th largest countries by landmass in the world. Together, they constitute an area covering 11,300 million square kilometers, surpassed only by Russia. The two countries have a population of 190 million inhabitants and represent about two thirds of South America's surface, population and Gross National Product (GNP).

They are both industrializing countries and have a medium size industrial capability. In the nineteen sixties and seventies, there was a period of military intervention in the Government of these two nations. During the nineteen eighties, Argentina and Brazil faced stagnation growth in their per capita GNP, and were subject to a vigorous inflationary process. In the mid nineteen eighties there was a process of re-democratization of the two countries. Today, they are undergoing an economic adjustment process, which has presented good results in curbing inflation. Both countries have recovered economic growth during the last few years. In 1995 there was some economic repercussions of the Mexican crisis. This effect stroked mainly Argentina's economy.

Together with Uruguay and Paraguay, Brazil and Argentina have set up a commercially integrated area, the Mercosul, which has increased trade in the region in 300% in the last six years.

For more than a century, Brazil and Argentina have shared a history of peaceful companionship. In all their history there was only one non-declared conflict which dates back to the territorial frontier settlements of the newly created countries. Their final disagreement regarding the use of the Prata Basin was solved in the late nineteen seventies.

However, such long and peaceful companionship was not enough to generate the desirable trust between both countries because some potential tension remained. The fact that, prior to 1991, neither Brazil nor Argentina had adhered to an internationally recognized instrument for the verification of the uses of nuclear energy concerned the international community, worried about the possibility of these two countries becoming engaged in the development of a nuclear device.

With regard to neighbor relationship, the uncertainty generated by the fact that Brazil and Argentina could domestically nourish the desire to assemble a nuclear device represented a hazard to their peaceful relationship.

Since the beginning of the nuclear era, Brazil and Argentina have been engaged in development efforts, counting primarily on international cooperation and on some self developed technology to achieve their goals.

Some specific safeguards agreements (INFCIRC/66 type agreements) involving the verification by the IAEA, ruled cooperation activities carried out in the two countries. Argentina held trilateral safeguards agreements with the USA and the IAEA for facilities and specific materials, and bilateral agreements with the IAEA for the application of safeguards to materials and equipment, which resulted from its technical cooperation with Germany, Canada and Switzerland. Brazil also held trilateral safeguards agreements involving the IAEA, the USA and Germany.

Both countries used their own technology to develop activities related to the nuclear fuel cycle. These activities ranged from ore mining to the fuel element itself or uranium hexafluoride. Also with self developed technology, Brazil and Argentina successfully achieved control over the uranium enrichment process and built ultra centrifuge (Brazil) and gaseous diffusion (Argentina) type enrichment facilities on a demonstration scale.

Argentina also developed on a small scale some activity in the reprocessing field, which has been deactivated. Likewise, the assembly of a reprocessing plant on a demonstration level has been interrupted with no prevision to restart construction. Argentina also autonomously developed the production of heavy water. In its construction of an industrial facility for heavy water production, Argentina opted for the use of foreign technology, which was subject to IAEA safeguards, prior to the entry into force of the full scope safeguards agreement.

The two countries have proven their capacity to produce material and equipment for use in nuclear facilities. In some cases this production has reached industrial scale.

Because of the region's importance, the international community welcomed Brazil and Argentina's reaffirmation, through means of International agreements, of their intention to use nuclear energy exclusively for peaceful purposes.

Having reaffirmed their intention to use nuclear energy exclusively for peaceful purposes during the period 1985-1990, and after several bilateral meetings and declarations at Head of State level, Brazil and Argentina signed the Bilateral Agreement for the Exclusively Peaceful Uses of Nuclear Energy in Guadalajara, Mexico, in July 1991. This agreement was ratified and came into force in December that same year.

During the period of negotiation and implementation of the Bilateral Agreement, Argentina and Brazil started negotiations, together with Chile, aimed at proposing

amendments to the Tlatelolco Treaty so that the three countries could be able to fully adhere to the Treaty.

In December 1991, Brazil, Argentina, the IAEA and ABACC signed the Quadripartite Agreement, which entered into force in March 1994, after long discussions, mainly on its approval by the Brazilian Congress. The Quadripartite Agreement determines the application of full scope safeguards of the same type as INFCIRC/153 agreements.

After acceptance by the OPANAL Council of the amendments to the Tlatelolco Treaty proposed by Argentina, Brazil and Chile, and having fulfilled all legal requirements in both countries, the Treaty came into force for Argentina and Brazil in January and May 1994, respectively.

In December 1994, the Congress of the Republic of Argentina authorized the country's adherence to the Non-Proliferation Treaty, and Argentine authorities presented the legal instruments for the country's adherence in February 1995.

Undoubtedly, the above-mentioned agreements demonstrate Argentina and Brazil's commitment to the exclusively peaceful use of nuclear energy.

THE BILATERAL AGREEMENT

The Bilateral Agreement, by means of which both countries undertake to use the nuclear material and facilities under their jurisdiction or control exclusively for peaceful purposes, is the basic legal instrument of the ABACC system.

The basic undertakings of the bilateral agreement are that the Parties undertake "to use the nuclear material and facilities under their jurisdiction or control exclusively for peaceful purposes" and to prohibit and prevent by all means any nuclear weapon. This commitment is identical to that established in the Tlatelolco Treaty, but the Bilateral Agreement innovates when it establishes that: "Bearing in mind that at present no technical distinction can be made between nuclear explosive devices for peaceful purposes and those for military purposes, the Parties also undertake to prohibit and prevent in their respective territories (...) any nuclear explosive device while the above-mentioned technical limitation exists". So the "explosions for peaceful purposes", foreseen in the Tlatelolco Treaty are not accepted in the scope of the Bilateral Agreement.

With this additional statement the commitment of the Bilateral Agreement is equivalent to that of the Nuclear Non-Proliferation Treaty (NPT) for Non-Nuclear Weapon States (NNWS).

In the Bilateral Agreement, as a basic control instrument, the Parties agreed to submit all nuclear material in all nuclear activities carried out in their territories or

anywhere under their jurisdiction or control to the Common System of Accounting and Control of Nuclear Materials (SCCC). The SCCC is a comprehensive system applied in both countries with the purpose of verifying that the nuclear material used in all nuclear activities is not diverted to purposes prohibited by the agreement. The Bilateral Agreement also establishes, in its Article VI, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), whose main responsibility is to administer the SCCC. The SCCC consists of the General Procedures and Implementation Manuals for each category of installation.

Any abnormalities detected as a result of the inspections or assessment of national records are to be reported by the Secretariat to the Commission, which may then call upon the concerned party to correct the situation. Serious non-compliance by either Party enables the other Party to abrogate the agreement and to notify the Secretary General of the United Nations and of the Organization of American States.

THE ABACC

The Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) consists of a four-member Commission appointed equally by the two countries and a Secretariat with headquarters in Rio de Janeiro, Brazil. The Secretariat consists of technical and administrative professionals appointed by the Commission, clerical staff, and inspectors. The present technical staff consists of ten people, five Brazilians and five Argentineans: one Secretary, one Deputy Secretary, two planning and evaluation officers, two operations officers, two technical support officers and two accounting officers. The higher-ranking technical officer of each country alternates annually as ABACC's Secretary. One administrative and finance manager and one institutional relations complete the team of ABACC professional staff.

The inspections are performed in a cross-national basis, with Argentine inspectors verifying facilities in Brazil and vice-versa. The inspectors do not work permanently for ABACC. They are experts who usually work for the National Authorities, or other official organizations in each country, and are convoked by ABACC's Secretariat whenever necessary. It should be noted that the team of inspectors consists not only of people working in safeguards at a national level, but also of experts from several areas of safeguards interest (NDA, DA, design and operation of nuclear installations, etc.).

The economic resources required for the implementation of the SCCC and the functioning of ABACC was established, in a general way, by the Bilateral Agreement; both countries share the costs on an equal basis. The regular operational budget of ABACC is of some US$ 3 million per year (this figure does not include the salaries of the inspectors and consultants, which are borne directly by both countries). In the last year ABACC also received a donation of US$ 400 000 of NDF/USA used in equipment, cooperation with DOE/USA and training.

THE QUADRIPARTITE AGREEMENT

The basic undertakings of the Quadripartite Agreement are:

- The acceptance by the Parties of safeguards on all nuclear materials in all nuclear activities, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other explosive devices
- The IAEA shall have the right and obligation to ensure that safeguards will be applied in accordance with the terms of the Agreement.
- ABACC undertakes to cooperate with the IAEA, in accordance with the terms of the Agreement.
- The IAEA shall apply its safeguards in such a manner as to enable it to ascertain that there has been no diversion of nuclear material to any nuclear weapon or other nuclear explosive device.
- The IAEA verification shall include, inter alia, independent measurements and observations.
- The IAEA verification shall take due account of the technical effectiveness of the SCCC.
- The signatory States, ABACC and the IAEA shall avoid unnecessary duplication of safeguards activities.

This Agreement is clear with regard to the relationship between ABACC and IAEA, mentioned in the Basic Undertakings and in various other articles. Furthermore, the four Parties have signed a Protocol specifying cooperation arrangements for the application of safeguards whose principles are:

(a) the need for ABACC and the Agency each to reach its own independent conclusions;
(b) the need to coordinate as far as possible the activities of ABACC and the Agency for the optimum implementation of the Agreement, and in particular to avoid unnecessary duplication of ABACC safeguards;
(c) when performing their activities, ABACC and the Agency shall work jointly, wherever feasible, in accordance with compatible safeguards criteria of the two organizations; and
(d) the need to enable the Agency to fulfill its obligations under the Agreement, taking into account the requirement for the Agency to preserve technological secrets.

Additionally, the Protocol establishes a Four-Party Liaison Committee, responsible for coordinating the application of the Agreement and of the Protocol and which may appoint a sub-committee for the implementation of safeguards that should foster adequate coordination between the IAEA, ABACC and both countries. Recently, the four parties agreed to establish a high level representation at this Committee which will certainly favor the implementation of the Quadripartite Agreement.

Since January of this year, the two organizations have been applying the GUIDELINES FOR THE COORDINATION OF ROUTINE AND AD-HOC INSPECTION ACTIVITIES BETWEEN THE AGENCY AND ABACC, which represents an important improvement on the coordination of safeguards activities in the framework of the Quadripartite Agreement.

These Guidelines consist of two parts: (a) general considerations underlying the coordination of routine and ad-hoc inspection activities between ABACC and the Agency, and (b) specific coordination arrangements for routine and ad-hoc inspection activities

THE INSPECTION SYSTEM

Table 1 gives the facilities and locations outside facilities (LOFs), containing nuclear material, covered by the system in Brazil and Argentina.

Type	Argentina	Brazil	Total
Conversion Facilities	5	1	6
Fuel Fabrication Facilities	4	1	5
Enrichment Facilities	1	3	4
Power Reactors	2	1	3
Research Reactors	6	3	9
Critical/Sub-critical Units	-	3	3
Storage Facilities			
HEU		1	1
Irradiated Fuel	1	-	1
Other	2	1	3
R&D Facilities	2	3	5
LOFs on Fuel Research	4	5	9
LOFs on Reprocessing Research	-	1	1
LOFs Analytical Laboratories	3	2	5
Other LOFs	7	6	13
Total	37	31	68

Table 1: Facilities and LOFs in Argentina and Brazil

The ABACC inspection system has established technical objectives for its own inspections. The present “goal quantities” and “timeliness goal” for plutonium, high- and low-enriched uranium, natural and depleted uranium and thorium are specified for different facility types. The inspection frequency is determined according to the General Procedures of the SCCC.

The list of ABACC inspectors must be approved by its Board Directorate (Commission) among those suggested by the Governments of Brazil and Argentina. These inspectors are convoked by the Secretariat whenever necessary. The team of inspectors consists of 73 persons, 39 being Brazilians and 34 Argentineans. Part of the inspectors work for the State System and part of them are experts from the nuclear area which allows ABACC to count on its inspector's team with individual inspectors who have more experience in a particular type of facility, due to his/her routine job, and they are preferably selected for inspections in those kind of facilities.

This is one of the main advantages of this system of inspections since the experts are familiarized with the type of facility to be inspected. The average level of relevant technical experience of the inspectors' staff is around 8 years.

Using the inspection effort defined for each facility and taking into account the operational program and the physical inventory taking (PITs) dates from the previous year, an annual general inspection program is prepared by the Operations area of ABACC. This program is coordinated with the IAEA because of the Quadripartite Agreement, in order to perform the inspections coordinated between the two Agencies. The inspections are grouped in missions, trying to minimize the number of travels of the inspectors.

Knowing the facilities and LOFs to be inspected and the type of inspection to be performed, the inspectors are selected and convoked by the Operations area, which calculate according to the activities to be executed, the time to be spent in the field and the time for pre- and post- inspection activities at ABACC headquarters.

ABACC keeps an inspection data bank that must be up-dated after each inspection mission. While the inspection report is being prepared in a computer, these information automatically up dates an auxiliary data base that is later on checked by the Operations area before modifying ABACC's inspection data bank.

The samples collected by the inspectors during the inspection are analyzed in a cross national basis in laboratories in Brazil and Argentina.

The metallic seals brought by the inspectors from the field are opened at ABACC headquarters office by the technical support personnel in order to check their authenticity.

The results of measurements made with portable multi-channel analyzer (PMCA) are copied and kept in diskettes organized according to the material balance area (MBA) and date and number of the inspection.

The first evaluation of the inspections is made by the inspectors at the field, and they try wherever possible to solve the possible pending problems at the moment.

After they finish the inspection reports at ABACC headquarters, these are discussed with the Operation and/or Planning and Evaluation Officers, who perform a second evaluation of the inspection. After this stage the reports are sent to the Planning and Evaluation area, which is responsible for the final evaluation (that may include evaluation of the declared MUF, Shipper-Receiver Differences and the significance of the operator/inspector differences) and for preparing the notification of the inspection results to the corresponding country.

Table 2 presents the number of inspections carried out by ABACC per year since 1992 until June 1996, in compliance with its objectives. It is also presented in this table the inspection effort (persons-day in the field) and the availability of inspectors for ABACC (persons-day total). The inspectors availability is a very important number to ABACC and the relation of inspection effort to inspectors availability (C/B) is improving because the inspectors are better trained, the coordination of the missions are improving and the activities to be performed at the facilities and LOFs are known. In the near future it is expected to improve even more this figure because of the use of the inspections data bank, that organizes the main inspection data and that is now being implemented for routine use. The possibility of using notebooks by the inspectors in the field will also reduce the post-inspection time needed for preparing the inspection reports.

	1992	**1993**	**1994**	**1995**	**1996**
Number of Inspections	11	35	186	149	160
Inspection Effort (person-day)	28	106	562	683	627
Inspector Available (person-day)	114	373	1506	1489	1415
C/B	4	3.5	2.7	2.2	2.2

Table 2 - ABACC's Inspections

During the year of 1996 the distribution of these number of inspections are the following:

INSPECTION TYPE-YEAR 1996	ARGENTINA	BRASIL	TOTAL
DIQ verification or re-verification	-1	7	8
Physical Inventory Verification	39	35	74
Interim inspections	15	23	38
Accompanying IAEA inspections	13	10	23
Spent fuel transference (21 days duration each)	8	-	8
Unannounced Inspections	-	2	2
Short notice Inspections	-	-	-
Transference Verification	3	4	7
Total of inspections	79	81	160
Inspection Effort (person-day)	425	202	627

Inspector Availability (person-day)	853	562	1415

ABACC does not have its own laboratories or enough technical people to develop safeguards techniques for a particular application or to adapt and get acquainted with new methods and technologies there are raised and needs to be incorporated to be used by the inspectors. The technical capacity of both counties is used by ABACC that provides the coordination using its own technical personnel. Cooperation with other institutions as DOE/USA, CEA, EURATON, JRC, IAEA and some countries are very successful and profitable to overcome this point. Training courses and Seminars for ABACC Officers and inspectors are promoted with the participation of external organizations. Training in specific equipment or activity to be developed is also performed in laboratories from other countries always in the framework of technical cooperation agreements.

Groups of experts of Brazil and Argentina are also called by ABACC as consultants in order to discuss a particular technology whenever it is necessary.

In order to constantly check the status of the laboratories that analyze the samples collected by the inspectors, the ABACC technical support area keeps an inter comparison program running with the cooperation of NBL and IAEA (Seibersdorf).

THE ROLE OF REGIONAL SAFEGUARDS ORGANIZATIONS

The ABACC experience warrants an analysis of the role of a regional safeguards organization for non-proliferation.

With the coming into force of the Quadripartite Agreement, ABACC has gained the status of a regional organization whose nature is coherent with that of the IAEA; but with the capacity to reach its own independent conclusions. The fact that ABACC started its activities with the Quadripartite Agreement already signed—although not in force until March 1994 --, means that the SCCC was implemented taking into consideration its future relationship with the IAEA. The SCCC was conceived to complement the IAEA system with regard to the common non-proliferation objective.

It is expected that regional organizations will play an important role in non-proliferation. In order to make this possible, the regional organization must not be assigned a passive and/or intermediate role between countries and the Agency. On the contrary, it should be assigned an active role in efforts fostering non-proliferation, preserving the effectiveness of “neighbors watching neighbors”.

The Quadripartite Agreement already establishes the criteria for routine inspection characteristics of the so-called “effectiveness of ABACC’s safeguards”, which should be evaluated by the Agency. The future role of the Agency should be that of increasingly assuring and verifying the quality of regional systems without prejudice to these systems’ own conclusions. Even if there is, at a first stage and in some installations, a 100% quality verification, in the future, it is expected that a more

coherent proportion be attained, taking into account the optimum efficiency and effectiveness of the system.

ABACC intends to contribute to peace, which in nuclear terms means avoiding vertical and horizontal nuclear proliferation. The safeguards applied by ABACC are only meaningful if they help to achieve the objective of non-proliferation.

To deal with horizontal non-proliferation – which concerns ABACC more directly – we must consider, on one hand, the motivations (or the over-lap of motivations) that can induce a country to build-up a nuclear device. On the other hand, we must consider the barriers opposing this intent. The relative importance or motivation factors and de-motivation barriers varies from case to case.

The application of safeguards – at a regional or international level – should be seen as one of the mentioned barriers. A non-proliferation policy must also consider other barriers. First, there are natural barriers represented by technological know-how and the necessary economic resources to build-up a nuclear device. Secondly, there are external barriers represented by international restrictions to the trade or exchange of nuclear materials, equipment and know-how.

The importance of these external barriers to non-proliferation are often over-estimated. There are even some cases where measures against proliferation can act in the opposite sense. We could say that they have two components with opposite directions: ordinary, the short term furthers non-proliferation, while the long term could lead to proliferation.

Finally, we also need to take into consideration the domestic and regional forces that contribute in each country or region to the decision to use nuclear energy only for peaceful purposes. Schematically, for democratic countries such as Brazil and Argentina, and in the absence of any important external menace, the most important barrier is that of domestic resistance to proliferation. This resistance has an important component among scientists and technicians whose knowledge would have been indispensable for the development of a nuclear device.

Non-proliferation policy will not be effective if only these barrier aspects are considered and the motivation aspect, which may lead a country to arm itself with nuclear devices, is disregarded. Nowadays, regional stress is the principal proliferation motivation. Following regional stress is the world status, which in practical terms is attached to the owner of a nuclear arsenal, and also the economic advantages of that owner. Finally, there are direct and indirect benefits from the mastery of technological knowledge related to the construction of a nuclear device that must be reduced.

The very successful world policy on non-proliferation, whose main protagonist is the International Atomic Energy Agency, derives from the fact that the IAEA has not only known how to impose proliferation barriers but also through contribution reducing technological and economic motivations that could lead a country to

develop nuclear energy for non-peaceful uses through dissemination of the peaceful uses of nuclear energy.

It is very clear that the main concerns about nuclear proliferation today are related to regional problems in the Middle East, the two Koreas, and between India and Pakistan. It is therefore natural to think about a regional solution for these regional problems and prevent other cases.

The regional approach in applying safeguards acts positively on the two main aspects to favor nonproliferation: reinforcing the barrier and reducing regional motivation for nuclear proliferation.